Medical Science

Prescribing aerobic exercise for patients with wearable devices – a practical approach for healthcare providers

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To Cite:
Biłat W, Woźniak M. Prescribing aerobic exercise for patients with wearable devices – a practical approach for healthcare providers. *Medical Science* 2024; 28: e73ms3381
doi: https://doi.org/10.54905/disssi.v28i149.e73ms3381

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Peer-Review History
Received: 28 April 2024
Reviewed & Revised: 02/May/2024 to 06/July/2024
Accepted: 10 July 2024
Published: 15 July 2024

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

DISCOVERY
SCIENTIFIC SOCIETY

ABSTRACT
Purpose: Most studies use VO2 max as a marker for exercise intensity; however, it is impossible to measure daily. The rising popularity of heart rate monitoring wearable devices could offer a more accessible way of exercise intensity monitoring and prescribing activity by healthcare providers. This paper aims to compare the approach of popular wearable devices to heart rate monitoring and provide a practical guide on using the readings in individualized exercise prescriptions. *Previous research:* Previous studies investigated wearables for activity prescription and compared the maximum heart rate (MHR) and heart rate reserve (HRR) markers; however, it was not determined which was superior. *Methods:* We analyzed zones proposed by each manufacturer and compared them with HR ranges cited in research for fat-burning and cardiovascular fitness. Later, we assessed their usefulness for exercise prescriptions. We compared MHR and HRR as indicators of exercise intensity using available research. *Results:* We found HRR to be a superior indicator of relative exercise intensity because it allows us to consider an estimated fitness level and the patient's age. The paper demonstrates an example of converting zones between manufacturers. Based on the received data, we proposed example prescriptions for patients using wearable activity trackers. *Conclusion:* Healthcare providers could benefit from using wearable devices in prescribing aerobic exercise for patients when available. While universal MHR-based to HRR-based zone conversion is not feasible, either can be used. However, HRR-based devices should be preferred when available.

Keywords: Heart rate reserve, aerobic exercise, fat reduction, obesity, cardiovascular fitness, smartwatches

1. INTRODUCTION
Physical activity is an integral part of the treatment of obesity and many metabolic disorders, including metabolic syndrome and type 2 diabetes. At the

same time, physical activity is necessary to maintain normal health in people of average weight and without known metabolic disorders. The World Health Organization (WHO) recommends that adults aged 18–64 get at least 150–300 minutes of moderate-intensity aerobic physical activity or at least 75–150 minutes of vigorous-intensity aerobic physical activity per week. Epidemiological studies have shown an inverse association between cardiorespiratory fitness (CRF) and all-cause mortality in healthy participants (Kodama et al., 2009).

The studies used maximum oxygen consumption (VO2 max), which requires professional equipment to measure. Metrics calculated by "smart" wearable devices, though not as accurate (Müller et al., 2019), are more easily accessible and still helpful in determining exercise intensity. These metrics come from calculations presented as heart rate zones using either maximum heart rate (MHR) or heart rate reserve (HRR). HRR means the range of heart rate between MHR and resting heart rate (RHR) (Choi et al., 2017) (Table 1).

Table 1 Heart rate measures

Measure	**The way of acquiring**
Resting heart rate (RHR)	Measured by a wearable device or measured clinically by auscultation or palpation
Maximum heart rate (MHR)	Estimated by a wearable device or calculated via formula: MHR = 220 bpm – [age] or: MHR = 206,9 – (0,67 × [age]) (Franckowiak et al., 2011)
Heart rate reserve (HRR)	Calculated via the formula: HRR = MHR – RHR

The resulting values can then mark heart rate zones based on the desired physiological effects. From the perspective of public health and the prevention of cardiometabolic risk factors, it is essential to establish a "fat-burning" zone and a cardiorespiratory fitness zone.

2. PHYSIOLOGICAL ASPECTS OF HEART RATE ZONES

Heart rate elevation is a physiological reaction to physical activity, specifically aerobic. The longer the exercise lasts and the higher the intensity, the more calories are burned. The amount of carbohydrates and fatty acids burned varies depending on the level of heart rate elevation. The goal of obesity and other diseases or states (Table 2) treatment is to reduce body fat, so the most efficient method would be to keep the heart rate at which one burns the highest percentage of fatty acids relative to carbohydrates or other nutrients. Carey DG found that the highest fatty acids utilization occurs at 58,9–76,2% MHR (Carey, 2009). That range was called a "fat-burning" zone. Similarly, Achten et al., (2002) found that maximal fat burning occurred at 68,3–79,3% MHR.

Table 2 Diseases and states in which health benefits correlate with fat reduction

Obesity or overweight based on body mass index (BMI)
Visceral/abdominal obesity based on waist circumference (WC)
High body adiposity or visceral fat rating based on body composition analysis (BIA)
Excess visceral fat area (VFA) in dual-energy X-ray absorptiometry (DXA), computed tomography (CT) or magnetic resonance (MRI)

High cardiorespiratory fitness is a body weight-independent adverse risk factor for cardiovascular and all-cause mortality. Carey DG found that the highest oxygen consumption occurs at 67,6–87,1% MHR. That range can be called a cardiorespiratory fitness zone. Although the total number of calories burned is significantly higher in this range, a much smaller share is due to the burning of fatty acids – 3,11–3,45 fat kcal/min in fat burning zone versus 1,68 fat kcal/min at the upper range of cardiorespiratory fitness zone (Carey, 2009).

Comparison of different manufacturers' heart rate zone settings

Depending on the device manufacturer, heart rate zones are defined differently, some by %HRR and some by %MHR. Some manufacturers - Xiaomi, Garmin, and Polar, define their zones using MHR, while others, like Apple or Fitbit, utilize HRR (Table 3).

Table 3 Heart rate zones in different wearable devices

Xiaomi		**Garmin**		**Polar**		**Apple**		**Fitbit**	
%MHR						%HRR			
Relaxed	20–49%	-	-	-	-	-	-	Fat burn zone	40–59%
Light	50–60%	-	-	1	50–60%	1	50–60%		
Intensive	60–69%	1	60–70%	2	60–70%	2	60–70%	Cardio zone	60–84%
Aerobic	70–80%	2	70–80%	3	70–80%	3	70–80%		
Anaerobic	80–90%	3	80–90%	4	80–90%	4	80–90%	Peak zone	85–100%
VO2max	90–100%	4	90–100%	5	90–100%	5	90–100%		
		5	100–110%	-	-	-	-	-	-

It is worth noting that despite using the same variable, namely the HRR, various manufacturers use different heart rate thresholds for determining zone numbers. Conversion and direct comparison of the zones defined by MHR or HRR seems impossible because the HHR also depends on an individual's resting heart rate. Some manufacturers use increments of 10% to differentiate the zones, while others (like Fitbit) try to divide the zones depending on the functional benefit of maintaining the heart rate. Xiaomi uses adjectives instead of numbers. Garmin goes as far as to define the fifth zone above 100% MHR, which is generally not recommended other than for short bursts of activity in sports professionals. Despite the same criteria used, the zones and their thresholds seem unique to the manufacturer, as there are no identical combinations.

Monitoring the zones is crucial to achieving the intended results and maintaining safety during workouts. For example, lower zones provide emotional benefits and improve general fitness, while moderate to high zones promote fat utilization and enable one to burn more calories. Meanwhile, prolonged maintenance of the highest zone can increase cardiovascular risk. Out of all the manufacturers examined, Polar matches the precise classification formulated by Zhu et al., (2022) They define the following intensity zones and their respective %HRmax along with the accompanying benefits they offer:

The first zone, described as moderate activity, comprises 50–60% MHR. It offers mainly emotional and general metabolic benefits, not associated with increased energy utilization or fitness capacity.

The second zone, described as weight management, includes 60–70% MHR. It appears to be the zone with increased energy expenditure benefits, recommended for training for weight loss, while the intensity remains low enough to be easily maintained by untrained individuals.

The third zone, described as aerobic, encompasses 70–80% MHR. It is best suited for training endurance capacity.

The fourth zone, the anaerobic threshold, contains a heart rate range of 80–90% MHR. It offers the benefit of improving speed, strength, and aerobic capacity.

The fifth zone, described as the red line, constitutes 90–100% MHR. It consumes almost all the individual's energy and cannot be maintained longer. One should generally avoid this zone, save for well-trained athletes and professionals.

One can compare the zones proposed by Zhu et al., (2022) and different manufacturers (Table 4).

Table 4 Comparison of heart rate zones by MHR

Intensity zone	**%MHR**	**Zone by manufacturers**			**Benefits**
		Xiaomi	Polar	Garmin	
Moderate activity	50–60%	Light	1	—	Emotional, metabolic
Weight management	60–70%	Intensive	2	1	Fat burning
Aerobic	70–80%	Aerobic	3	2	Endurance
Anaerobic threshold	80–90%	Anaerobic	4	3	Speed, strength

Red-line	90–100%	VO_2max	5	4	Reserved for athletes

Comparison of MHR and HRR-derived zones

The goal of exercise prescriptions based on heart rate is to achieve exercise intensity producing comparable exercise-induced stress in individuals of varying fitness levels and comorbidities. Numerous methods could describe relative exercise intensity; however, reaching a balance between accuracy and ease of use is necessary. Although VO2 max remains the marker cited in most research, it is not practical to measure during casual activity. Other indicators are more widely available. These include VO2 reserve (VO2R), MHR, HRR, and blood lactate levels (Mann et al., 2013). Due to heart rate-based indicators being the most available and easy to use, one can assume only MHR and HRR would be helpful in prescriptions for an average patient. MHR depends primarily on an individual's age, while RHR primarily depends on fitness level (in adults 20+).

HRR, as a byproduct of both these factors – a more personalized marker, allows for adjusting exercise intensity to the patient, better reflecting the patient's unique circumstances, so much so that the American College of Sports Medicine (ACSM) recommends the use of HRR over MHR in exercise intensity prescriptions (Garber et al., 2011). It is still unclear whether MHR or HRR is the superior marker of exercise-induced stress. We could hypothesize since HRR has been proven numerous times to be a better indicator of cardiovascular (CV) health and corresponded better with overall CV mortality (Whitman and Jenkins, 2021); thus, optimizing training for and aiming to increase the HRR could lead to better CV outcomes. HRR correlates with components of metabolic syndrome (MetS) (Choi et al., 2017), which might make it a suitable marker to use for people with MetS to help them better adjust the exercise to their metabolic capacity.

HRR also better represents the amount of work the heart has to do to raise HR from various levels of RHR (Bangalore et al., 2006). Additionally, existing research mentions that HRR exposes signs of autonomic dysfunction, which might make it superior in patients with some autonomic imbalance or using medication that affects the autonomic system (Whitman et al., 2020). The cited research found HRR to be indicative of CV death risk. Depending on the study, patients with HRR in the lowest quintile (≤ 105,4 bpm) were about six times more likely to have MetS compared to those in the highest HRR group and patients in the second highest group four times more likely (Choi et al., 2017). Another study found that for each 1% HRR decrease, the risk for cardiovascular events increased by 2% (Bangalore et al., 2006). Similarly, Cheng et al., (2002) found a statistically significant correlation that for every ten bpm of HRR, CV risk was roughly 10% lower.

However, this was more significant in younger, fit men because their fitness and lack of comorbidities allowed them to reach their true HRR more easily. Based on the above, one could suspect that HRR is more indicative of general CV fitness than MHR and would provide an exercise intensity marker more indicative of the individual patient's CV capabilities. It is worth noting that the inability to reach 70% HRR during dobutamine stress echocardiography (DSE) was superior to 85% MHR as a marker for CV events and mortality (Bangalore et al., 2006; Whitman et al., 2020). It coincides with the threshold set for good fitness level by the ACSM. Recognizing the value of HRR in exercise prescription, the American College of Sports Medicine uses it to describe exercise load recommended for different fitness groups based on a rough habitual activity level (American College of Sports Medicine, 2009).

A classification that estimates the relative intensity of cardiorespiratory exercise based on %HRR exists. The available sources compared the metric with absolute markers such as Metabolic Equivalent of Task (MET) and subjective indicators of perceived exertion. The above proves a direct correlation between an absolute marker such as %HRR and the subjective rate of perceived exertion. It might help better explain to the patient expected levels of exercise intensity (American College of Sports Medicine, 2017). While moderate (40%–59% HRR) to vigorous (60%–89% HRR) intensity aerobic exercise is recommended for most adults, even light (30%–39% HRR) intensity aerobic exercise can be beneficial in deconditioned individuals, which is especially important with high-risk patients, often with metabolic syndrome (American College of Sports Medicine, 2017).

Because HRR depends on two factors (age and fitness level), it's necessary to calculate a suitable range for each patient. A general RHR for the 50th percentile was 69–71 bpm in the 20 and over age group. While we could use it for general MHR to HRR conversions, it is not indicative of a patient that most often requires an exercise prescription (higher than normal RHR, low fitness level) as the RHR in the 75th percentile (below average fitness) is 77–79 bpm and in the 90th percentile (low fitness) 85–87 bpm (Ostchega et al., 2011). If we add RHR as the second variable, we can consider the patient's fitness level (which RHR mostly depends on) on top of their age (MHR depends on age). While HRR is a better indicator, MHR would still be the most widely used as it is easier to calculate. However, where available, fitness trackers utilizing zones based on HRR would be preferable over MHR-based calculation. (Supplement 1) allows us to roughly estimate a desirable HRR range for patients with different ages and fitness levels.

3. DISCUSSION

While there is scientific evidence for determining heart rate zones based on MHR, we still lack direct research on which HRR range fat-burning and cardiovascular fitness improvements occur most strongly, and current calculations are theoretical. Although much scientific evidence suggests that HRR-dependent metrics are superior to MHR-dependent metrics, there is still a lack of research on the effect of physical activity on increasing HRR range and, secondarily, cardiovascular risk reduction. Moreover, calculating HRR in a clinical setting could prove unreliable due to the tendency for the heart rate to accelerate in such potentially stressful conditions. That is why HRR-based wearable devices would be preferable, as they measure RHR around the clock.

An inverse relation exists between the level of cardiorespiratory fitness and MetS risk. A 1 MET increase in the maximal treadmill exercise test was associated with a 16% and 17% adjusted risk reduction of metabolic syndrome in men and women, respectively, and a further 12% decrease in overall mortality (Greenwalt et al., 2023; LaMonte et al., 2005; Isath et al., 2023). The above suggests that training focused on increasing cardiorespiratory fitness and optimizing for maximal exercise test scores might prove helpful in decreasing MetS risk. However, for cardiorespiratory fitness improvement, the patient must maintain a heart rate interval, which they can only achieve with a tracking device. Due to the varying definitions of heart rate zones, we need to monitor heart rate values on the patient's device. While one should not reach the highest zone with most fitness trackers, some protocols like Tjønna et al., (2008) may call for short bursts of intense activity to improve cardiovascular fitness.

In such cases, it is essential to be aware of what the maximal heart rate zone is. Such is the case with Garmin, where the fifth zone remains above the 100% MHR threshold, which one should avoid even during intense training. Conversely, lesser exercise intensity still provides numerous benefits. A study of sedentary postmenopausal women showed a strong dose-response relation between the amount of exercise and change in cardiorespiratory fitness. While it may seem logical, the study also gave a less obvious conclusion that even at 50% of the recommended weekly activity (roughly 72 minutes per week of moderate-intensity training – at 50% VO2max during the six months), there was still a significant improvement in fitness compared to the control group. Moreover, the lesser required exercise volume coincided with a low dropout rate and high adherence. Additionally, there was a statistically significant reduction in waist circumference – an independent MetS risk factor, without a statistically significant change in body weight or body fat percentage (Church et al., 2007).

Likewise, Chan et al., (2004) reported that a pedometer-based physical activity intervention in a group of sedentary workers resulted in a decrease in waist circumference proportional to the increase in daily step count, while there was no association between BMI change magnitude and step count increase (Chan et al., 2004; Donnelly et al., 2009). Similarly, a study by Achten et al., (2002) showed moderate intensity training improved fat oxidation and possibly fat mobilization. Moreover, cardiorespiratory/endurance training led to lasting metabolic adaptations and a further increase in fat oxidation capability (Achten and Jeukendrup, 2004). Current reviews seem to support weight loss-independent metabolic benefits of moderate-intensity exercise and a proportional inverse relationship between physical activity and all-cause mortality. Moreover, research shows that individuals with low baseline physical activity had more significant benefits, suggesting "the least active have the most to gain" (Isath et al., 2023).

The above shows that any increase in physical activity, even less than prescribed, which the weight loss patients often struggle with, results in significant health benefits (Greenwalt et al., 2023; Isath et al., 2023). Furthermore, it could benefit to focus on patient motivation to undertake any form of physical activity even if they cannot meet the desired exercise volume. However, a well-tailored prescription could attenuate the issue as the ACSM mentions higher adherence to moderate-intensity exercise in untrained individuals (Garber et al., 2011). Research suggests that the prescription should be tailored to the patient's capabilities even if they fall short of the general recommendations, which makes individualized prescriptions critical (Figure 1 and Figure 2 for examples) (Greenwalt et al., 2023).

Rp.

Aerobic exercise (e.g., walking, cycling, swimming) for 30 minutes.

5x / week

Intensity: name/number of the heart rate zone, based on wearable device brand

- Xiaomi: intensive zone
- Garmin: zone 1
- Polar: zone 2
- Apple: zones 1 and 2
- Fitbit: fat burn zone

Figure 1 Sample aerobic physical activity prescription for a patient with a heart rate measuring wearable device with a primary goal of body fat reduction

Rp.

Aerobic exercise (e.g., walking, cycling, swimming) for 30 minutes.

5x / week

Intensity: name/number of the heart rate zone, based on wearable device brand

- Xiaomi: aerobic and anaerobic zone
- Garmin: zones 2 and 3
- Polar: zones 3 and 4
- Apple: zone 3
- Fitbit: cardio zone

Figure 2 Sample aerobic physical activity prescription for a patient with a heart rate measuring wearable device with a primary goal of cardiovascular fitness enhancement

Some studies show that employing the patient's fitness tracker could help increase engagement by providing a real-time monitoring tool and using the novelty factor (Garber et al., 2011; Isath et al., 2023). Emerging research also shows personal fitness trackers as a practical way of determining the patient's physical activity levels (Casado-Robles et al., 2023). There are also limitations to consider. While numerous heart rate monitoring devices are available, we examined only the most popular brands. Furthermore, the calculations only reflect the heart rate zone mapping when publishing. Both the availability of devices and zone calculation methods might be subject to change with time. The above examples should accentuate the general problem of the discrepancies in methodology, which are likely to remain in future products, but any new devices should remain helpful for heart rate-based activity prescription.

Another limitation of using a heart rate monitoring device in an outpatient setting could be the subjective nature of the patient's exercise intensity assessment. It remains unclear whether device-assisted patient self-monitoring would prove the best option. The patient might not reach their correct maximum exertion level and incorrectly represent their cardiovascular fitness level. However, as shown above, any amount of activity appears to result in a positive outcome; therefore, the accuracy might be of less consequence than the expected engagement benefit (Greenwalt et al., 2023; Isath et al., 2023).

4. CONCLUSION

This review might offer insight for healthcare providers on how to aid their patients in choosing the right amount and intensity of aerobic physical activity in an objective, prescription-like manner, depending on the wearable device the patient uses. We should prioritize HRR-based devices as more representative of overall fitness. Every amount of activity offers benefits, whereas personalized prescriptions result in the most favorable clinical outcomes.

Highlights

What we knew on the topic

Both maximum heart rate and heart rate reserve are indicators of exercise intensity.
Wearable devices are widespread and useful for activity monitoring.

What the study added to our knowledge

Heart rate reserve appears to be a superior marker for exercise intensity.
Continuous heart rate monitoring offered by wearable devices enables the use of heart rate reserve for exercise prescription.
Even below-recommended levels of physical activity bring significant health benefits.

Acknowledgment

The authors would like to acknowledge the anonymous reviewers whose valuable comments and suggestions will improve the quality of this paper.

Author Contributions

W Biłat: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization; M Woźniak: Methodology, Writing – original draft, Writing – review & editing, Supervision, Project administration. All authors contributed to editorial changes in the manuscript. All authors have read and agreed to the published version of the manuscript.

Ethical approval

Not applicable.

Informed Consent

Not applicable.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

Supplement 1 Simplified heart rate zone ranges for physical activity prescribing

HR measure	Age	RHR percentile	Body fat reduction	Cardiorespiratory fitness enhancement	Both
MHR range (Carey, 2009)			58,9% - 76,2%	67,6% - 87,1%	60,2% - 80,0%
Estimated HRR range based on age and fitness level	20	25th percentile (above average fitness)	39,6% - 65,0%	52,4% - 81,0%	41,5% - 70,6%
		50th percentile (average fitness)	36,3% - 63,1%	49,8% - 80,0%	38,3% - 69,0%
		75th percentile (below average fitness)	32,1% - 60,7%	46,4% - 78,7%	34,2% - 66,9%
		90th percentile (poor fitness)	27,3% - 57,9%	42,7% - 77,2%	29,6% - 64,6%
	25	25th percentile	38,8% - 64,6%	51,8% - 80,8%	40,8% - 70,2%
		50th percentile	35,4% - 62,6%	49,0% - 79,7%	37,4% - 68,5%
		75th percentile	30,9% - 60,0%	45,5% - 78,3%	33,1% - 66,4%
		90th percentile	25,8% - 57,0%	41,5% - 76,7%	28,1% - 63,9%
	30	25th percentile	38,0% - 64,1%	51,1% - 80,5%	40,0% - 69,8%
		50th percentile	34,4% - 62,0%	48,3% - 79,4%	36,5% - 68,1%
		75th percentile	29,6% - 59,3%	44,5% - 77,9%	31,9% - 65,8%
		90th percentile	24,2% - 56,1%	40,2% - 76,2%	26,6% - 63,1%
	35	25th percentile	37,2% - 63,6%	50,5% - 80,3%	39,1% - 69,4%
		50th percentile	33,3% - 61,4%	47,4% - 79,1%	35,4% - 67,5%
		75th percentile	28,3% - 58,5%	43,5% - 77,5%	30,5% - 65,1%
		90th percentile	22,4% - 55,1%	38,8% - 75,6%	24,9% - 62,2%
	40	25th percentile	37,3% - 63,7%	50,6% - 80,3%	39,3% - 69,5%
		50th percentile	32,7% - 61,1%	47,0% - 78,9%	34,9% - 67,3%
		75th percentile	27,5% - 58,0%	42,8% - 77,2%	29,8% - 64,7%
		90th percentile	21,3% - 54,4%	38,0% - 75,3%	23,8% - 61,7%
	45	25th percentile	36,3% - 63,1%	49,8% - 80,0%	38,4% - 69,0%
		50th percentile	31,5% - 60,3%	46,0% - 78,5%	33,7% - 66,7%
		75th percentile	25,9% - 57,1%	41,5% - 76,7%	28,2% - 63,9%
		90th percentile	19,2% - 53,2%	36,3% - 74,6%	21,7% - 60,7%
	50	25th percentile	35,3% - 62,5%	49,0% - 79,7%	37,4% - 68,5%
		50th percentile	30,1% - 59,5%	44,9% - 78,1%	32,3% - 66,0%
		75th percentile	24,1% - 56,0%	40,1% - 76,2%	26,5% - 63,0%
		90th percentile	16,8% - 51,8%	34,4% - 73,9%	19,5% - 59,5%
	55	25th percentile	34,2% - 61,9%	48,1% - 79,3%	36,2% - 68,0%
		50th percentile	28,6% - 58,7%	43,7% - 77,6%	30,9% - 65,3%
		75th percentile	22,1% - 54,9%	38,6% - 75,5%	24,5% - 62,1%
		90th percentile	14,2% - 50,3%	32,3% - 73,1%	16,9% - 58,2%
	60	25th percentile	32,9% - 61,1%	47,1% - 78,9%	35,0% - 67,3%
		50th percentile	27,7% - 58,2%	43,0% - 77,3%	30,0% - 64,8%
		75th percentile	20,8% - 54,1%	37,5% - 75,1%	23,3% - 61,4%
		90th percentile	12,3% - 49,2%	30,9% - 72,5%	15,1% - 57,3%
	65	25th percentile	31,5% - 60,3%	46,0% - 78,5%	33,7% - 66,7%

		50th percentile	25,9% - 57,1%	41,6% - 76,8%	28,3% - 64,0%
		75th percentile	18,3% - 52,7%	35,6% - 74,4%	20,9% - 60,3%
		90th percentile	9,0% - 47,3%	28,3% - 71,4%	11,9% - 55,7%
	70	25th percentile	29,9% - 59,4%	44,8% - 78,0%	32,2% - 65,9%
		50th percentile	23,9% - 55,9%	40,0% - 76,1%	26,3% - 63,0%
		75th percentile	15,5% - 51,1%	33,4% - 73,5%	18,2% - 58,9%
		90th percentile	5,2% - 45,1%	25,2% - 70,2%	8,2% - 53,8%
	75	25th percentile	28,2% - 58,4%	43,4% - 77,5%	30,5% - 65,1%
		50th percentile	21,6% - 54,6%	38,2% - 75,4%	24,1% - 61,8%
		75th percentile	12,4% - 49,3%	30,9% - 72,5%	15,1% - 57,4%
		90th percentile	0,7% - 42,5%	21,7% - 68,8%	3,8% - 51,7%

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